RESEARCH ON MILK PRODUCTION IN SAANEN GOATS UNDER DIFFERENT FARMING CONDITIONS

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Abstract

In the context of increasing consumer interest in goat milk products, more and more breeders have focused on improving milk production for the local goat breeds or have opted for raising specialized imported breeds. The present study aims to present the evolution of milk production in the case of 30 Saanen goats included in the purebred breeding studies of the Breed Genealogical Register. The milk production of the 30 goats from two far, whit different exploitation systems, traditional (lot 1- in Iaşi county) and permanently in stabulation (lot 2- in Constanta county), has been monitored for five years (2019-2023), revealing the productive potential under different exploitation and nutrition conditions. The average annual milk production in the two lots varied depending on the exploitation conditions, with values ranging from 797.7 kg/lactation to 907.03 kg/lactation in permanently stabulation condition compared to 542.27 kg/lactation and 626.05 kg/lactation in the traditional exploitation system. These values were higher than the milk production of local goat breeds, but lover than the production reported for Saanen goats in the other Genealogical Registries (France).

Key words: goat, milk, exploitation conditions, quantity

INTRODUCTION

Goats are known as one of the most significant species, having both biological and economic importance. They are found in many regions of the world and are valued for their distinctive features.

In our country, the main purpose of goat rearing and farming is milk production and the amount of milk produced by a goat depends on the conditions of care, nutrition and level of improvement [1].

In many countries around the world, there is a growing demand for the highest quality goat dairy products.

The interest in goat milk has also increased in our country, which has led to need to expand research on this species, on nutrition, exploitation conditions, milk and meat processing methods, etc.

Increased interest in goat farming has also been observed among Romanian goat breeders, who, in order to maximize their productive potential, have turned to research results and have approached various strategies, including importing specialized breeds of goats for milk production [2].

The Saanen breed is one of the specialized breeds for milk production and has been imported in large number into our country. Originating from Switzerland, this breed was formed in the region in the valley of Saanen River and spread widely to European countries, where it was used to improve local breeds in order to increase milk production [3].

The average milk production of goat of this breed in France is 946 l in 306 lactation days [4], in Romania 740 l in 270 lactation days [5], in Russia 630 l in 305 lactation days [6] and in Turkey 594 l in 300 lactation days [7].

The Saanen breed has a waist of 80-90 cm in males and 74-80 cm in females, an elongated body and suitable long and broad head with an almost straight profile. The chest is deep, broad with good thoracic capacity, broad and well strong joints, developed musculature and correct aplomb [8].

The breed's prolificacy is 150-170%. Young reach sexual maturity in 5-6 months for females and 7 months for females. Females can be included in the breeding process at the age of 7-8 months with a minimum body weight of 32 kg, while males can be used in breeding process after the age of 6 months and reaching a body weight of over 40 kg [9].

France is one of the top performing countries in terms if breeding Saanen goats. Currently, goat breeding in this country is carried out by an inter-professional organisation, Capgenes and comprises 350.000 Saanen goats of which 114.000 are under control [10].

In Romania, goat breeding is carried out by the National Association of Goat Breeders in Romania- ANCC CAPRIROM, accredited since 2006 to manage the Genealogical Register for this breed.

In the early years, the Association faced challenges in implementing the Breeding Programs due to the small number of breeders and the small goat herds. As they understood the importance of selection in improving milk production, more and more breeders joined the Genealogical Register, reaching a number of 48 breeders with a total herd of 6200 Saanen goats [9].

The main tools of breeding by selection in order to increase the profitability of milk production in the Saanen breed under the pedo-climatic and exploitation conditions specific to our country are the selection of breeders, the matching of pairs according to the breeding value and the avoidance on inbreeding [10].

The objective of this study is to follow the evolution of milk production in 30 Saanen goats included in the breeding of the Genealogical Register on two farms with different farming systems, traditional and stabulation.

MATERIAL AND METHOD

For the study, the biological material belonged to the Saanen import breed, included in the breeding work of the Genealogical Register.

The research was carried out on 30 adult Saanen goats on two farms with different farming systems. Thirty females of the same age, at the same stage of lactation, respectively lactation 2-6, were chosen and divided into two separate groups of 15 goats. Batch 1 (L1) in Iasi County was kept in the traditional farming system and batch 2 (L 2) in Constanta County was kept in stabulation system.

In the traditional systems on the farm in Iasi County, the goats were kept free on the farm's own pasture from April to October, during which time the goats' nutrition was supplemented with 500 g of concentrated mix (70% corn, 20% barley, 10% sunflower) divided into 2 trays, for morning and evening milking. From November to March, goats were kept in the stabulation system, receiving 1.5 kg concentrate mix, 4 kg mown and dried pasture hay fed in two trays and straw at discretion. Throughout the year, the goats were provided with salt pellets and mineral-vitamin blocks, as well as water at discretion, even during grazing with access to a permanent water source.

The 15 goats in Constanta County Batch 2 were kept in stabulation, receiving a constant ration of 2 kg of concentrated mix (70%maize, 15% barley, 10% sunflower, 5% soia), 3 kg of lucerne fed in 3 trays and straw at discretion.

The goats were monitored over 5 lactations (2019-2023) and gravimetric measurement of milk production was performed in the third, fourth and fifth months of lactation with two controls per day, morning and evening. Indicate the name and version of any software used in the statistical processing of the data.

The deworming programs differed between the two farms. Thus, Batch 1 was dewormed internally 3 times, before the grazing period (March), before the start of the breeding season (July) and before entering the stall (October), while external parasites were bathed in spring and injected in autumn before entering the stall.

Batch 2 received external deworming with pour-on products during was carried out once in spring after the end of the calving season and once in autumn before breeding season, but only after coproparaziological examination.

The animals were monitored over 5 lactations (2019-2023) and gravimetric measurement of milk production was performed in the third, fourth and fifth months of lactation with two controls per day, morning and evening.

Milk production control is carried out by the A4 standard method, for three consecutive months, two controls per day, morning and evening.

To determine milk yield, we applied the Fleishmann formula [11].

$$SM = I_0 M \left(\frac{M_1 + M_2}{2}\right) + I_1 \left(\frac{M_2 + M_3}{2}\right) + .. I_{n-1} \left(\frac{M_{n-1} + M_n}{2}\right) + I_n M_n$$

in which:
MS- milk production per lactation (ml);
M_1, M_2, M_n- the quantity of milk (ml) at the 24 hours control;
I_0- the interval (days) between the milking start date and the date of the first control;
I_1, I_2, I_{n-1}- interval between controls (days);
I_n- the interval in days between the date of the last control and the end of lactation.

Testing the statistical significance of differences between means of milk yields from 2019-2023 was performed using Single Factor ANOVA from Excel 2007.

RESULTS AND DISCUSSIONS

This study is a detailed evaluation to examine and compare the performance of Saanen goats under various different exploitation and nutrition conditions. Over five years, we evaluated two batches of Saanen goats, kept under different conditions, covering a variety of factors from growing conditions and nutrition to the of climate change.

This research provides not only a picture of goat performance, but also a deeper insight into the issues affecting goat welfare in different farming systems.

The results can contribute to the development of more efficient and sustainable practices in goat breeding and exploitation.

Over the five years of monitoring Batch 1, we have observed an interesting evolution in terms of average milk production. In the first two years of the study, the average milk production remained relatively constant, recording values around 625 kg/milk/female, while the following years showed a significant decrease in production, probably influenced by climatic factors, such as the drought in 2021. However, in 2023, average milk production showed a slight recovery, but lower than the first 2 years (Figure 1).
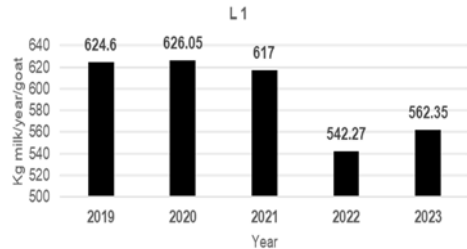

Fig. 1 Milk production over the 5 years (2019-2023), batch 1 (L1), (kg.milk/year/ goat)

Following the Single Factor ANOVA Analysis, we found that are differences between the mean yields in the range studied (2019-2023) with an extremely low level of significance ($P < 0.05$).

The averages of production by dairy for the 5 years studied show that the highest average production was achieved in 2020, followed by a decrease in subsequent years.

The coefficient of variation between 3.99% and 7.79%, indicates a moderate variability of milk production remained relatively constant with some minor fluctuations (Table 1).

Table 1 Evolution of statistical indicators of average annual milk production in batch 1 of Saanen goats

| YEAR | AVERAGE± STANDARD DEVIATIAON (kg.milk/year/ goat) | COEFFICIENT OF VARIATION % | LIMIT | |
			MAXIMUM (kg.milk/year/ goat)	MINIMUM (kg.milk/year/ goat)
2019	624.6±26.38	4.21	676.65	585.45
2020	626.05±35.57	5.68	686.5	564
2021	617±48.11	7.79	712.95	552.3
2022	542.27±28.22	5.20	604	492.95
2023	562.35±22.47	3.99	587.1	522.6

As regards Batch 2, kept in stabulation, in Constanța County, we have observed significant developments in milk production over the five years. The analysed data show a general upward trend in milk a production in the first three years, with a peak in 2021, followed by a slight decrease a general upward trend in milk peak in 2021, followed by a slight decrease in 2022 and a return to higher levels in 2023 (Figure 2).

According to the results of the Single Factor ANOVA analysis, significant differences in milk yield are also found for L 2 ($P < 0,05$; P= 6,24767E-12).

Within this breeding system, the average yields per lactation for the 5 years studied show that the highest average yield was achieved in the year 2021, reaching the maximum value of 907.03 kg.
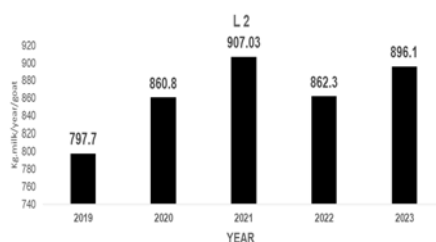

Fig. 2 Milk production over the 5 years (2019-2023), batch 2, (kg. milk /year/ goat)

The coefficient of variation, between 5,77% and 7,63%, indicates a relative uniformity in milk production over the period (Table 2).

Table 2 Evolution of statistical indicators of average annual milk production in Batch 2 of Saanen goats

| YEAR | AVERAGE± STANDARD DEVIATIAON (kg.milk/year/ goat) | COEFFICIENT OF VARIATION % | LIMIT | |
			MAXIMUM (kg.milk/year/ goat)	MINIMUM (kg.milk/year/ goat)
2019	797.7±60.85	7,63	885.9	686.1
2020	860.8±62.93	7,30	956.47	757.5
2021	907.03±52.36	5,77	984.47	805.8
2022	862.3±57.30	6,64	970.95	780.2
2023	896.1±58.05	6.37	971.4	802.87

Analysing the average milk yields for the two batches operated under different farming systems in 2019-2023, a significant difference in performance can be observed.

Average milk production increased significantly in both lots over the study period, but in Lot 2 production levels are higher registering an increase of about 45.15% compared to the total Lot 1 average, showing that feeding with a controlled and relatively constant ration led to the expression of breed- specific productive potential (Figure 3).
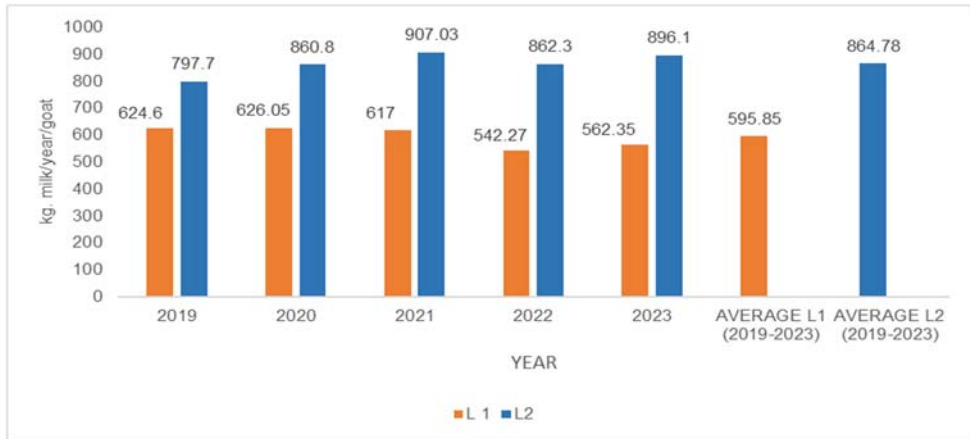
Fig. 3 Dynamics of milk production evolution in the two batches (kg. milk/year/goat)

CONCLUSIONS

In conclusion, this study shows that there are significant differences in milk production between the two groups. These differences are attributed to factors such as farm conditions and different nutrition. Batch 2, kept in stabulation had a total average production of 864.24 kg of milk during the years studied, higher than lot 1, which was kept in traditional system and had average milk production of 594.74 kg of milk.

Based on the determinations made, it can be said that both flocks experienced decrease in average milk production in2022. This in reduction can be partly attributed to the effects of the drought in 2021, which had a negative impact on feed availability and quality and therefore on the drought in 2021, which had a negative impact on feed availability and quality and therefore on the production performance of the animals. From the analysis of the results, it can be stated that keeping animals in stabulation has a positive effect on their performance.

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